* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates the luminosity of the picture to display, contrast, hue, etc. to a television receiver which an operator can adjust, and an image quality regulating method for the same.
[0002]
[Description of the Prior Art]Conventionally, picture quality adjustment in a television receiver or a computer monitor is performed, when an operator indicates to reliance by OSD (On ScreenDisplay) individually and adjusts an adjustment knob about luminosity, contrast, hue, etc.
[0003]Two or more data sets (constructing) of two or more kinds of picture quality adjustment items are memorized beforehand, and the selectable picture quality adjustment is proposed in the set of an operator's request out of two or more they-memorized sets as indicated by JP,8-22034,B. Here, the picture quality adjustment proposed conventionally is explained with reference to drawing 17.
[0004]In the figure, 3.8 is a video chain including the Y/C separation circuits which separate a luminance signal and a chrominance signal from the video signal, a color synchronization circuit, a color demodulation circuit, etc. by performing general processing to the video signal of the preceding paragraph of the picture quality adjusting circuit 3.3 thru/or the latter part. 3.9 is a deviation high-tension circuit which manages the deviation of the display for indication 3.6, and high voltage relations. 3.10 is power amplification which drives a loudspeaker.
[0005]3.5 is a selectable menu about the choice for which it asks in any out of a certain choice to A-D about an image and a sound, respectively. 3.13 is a menu memory which has memorized two or more said digital signal data corresponding to the choice of the menu 3.5. Image menu data A-D which adjusts this element to this menu memory 3.13 for every image

quality setting means and which is an image quality control signal, and the voice menu data A-D which is voice control signals are memorized.

[0006]3.11 is a D/A converter which changes into an analog signal the voice control data which controls the image quality control data and the tone control circuit 3.4 of the picture quality adjusting circuit 3.3 which are outputted as a digital signal from the microcomputer (microcomputer) 3.12.

[0007]When which choice is chosen about an image and a sound with the menu 3.5, in the above-mentioned composition the microcomputer 3.12, The data of the selected image, the image quality control signal corresponding to an audio choice, and a voice control signal is read from the menu memory 3.13, and it outputs by the image quality and tone quality according to the read data.

[0008]

[Problem(s) to be Solved by the Invention]The method which adjusts an adjustment knob individually about each picture quality adjustment items (luminosity, contrast, etc.) among the conventional examples mentioned above, Operation of what an operator can adjust to favorite image quality is not slightly complicated, and since it becomes the operation which chooses which choice of the menu 3.5 in the conventional example shown in drawing 17, it is not necessarily setting out on which the picture of the favorite image quality for which which selected choice asks can be displayed. For this reason, an operator has the necessity of repeating repeatedly the check of the picture displayed according to the selection operation and the selected image quality of a menu, and is inconvenient until a display image is expressed as the favorite image quality for which it asks.

[0009]Then, this invention aims at offer of a television receiver which can be adjusted, and an image quality regulating method for the same in the image quality which asks for a display image easily.

[0010]

[Means for Solving the Problem]In order to attain the above-mentioned purpose, a television receiver concerning this invention is characterized by the following composition.

[0011]Based on this invention, i.e., decrypted input moving image image data, it is a television receiver which displays a picture on a display for indication, and the 1st operational mode is characterized by comprising the following:

An image processing means which performs predetermined image processing (for example, definition conversion processing or trimming treatment) to said input moving image image data.

An image quality adjusting means which performs two or more kinds of different picture quality adjustments in the 1st operational mode to dynamic image data in which image processing was carried out by said image processing means.

A display control means which displays several sample video in which image quality differs in the 1st operational mode based on two or more kinds of dynamic image data to which image quality was adjusted by said image quality adjusting means, respectively on the same display screen of said display for indication.
An image quality setting-out means by which image quality of video at the time of displaying on said display for indication based on input moving image image data in the 2nd operational mode can be set up according to sample video chosen in any from said two or more sample video currently displayed on said display for indication in the 1st operational mode.

[0012]Preferably, so that said image quality adjusting means may perform said picture quality adjustment from which two or more kinds differ to real time to dynamic image data in which image processing was carried out by said image processing means. It is good to make real time display several sample video in which image quality differs, respectively on the same display screen of said display for indication based on said two or more sample dynamic image data in which said display control means is outputted in parallel from said two or more image adjustment modules including two or more image adjustment modules.
[0013]Said image quality adjusting means is good to perform filtering of a time base direction to dynamic image data in which image processing was carried out by said image processing means.
[0014]Said image processing means is good to choose definition conversion processing or trimming treatment according to the number of kinds of said sample video.
[0015]Or in order to attain the above-mentioned purpose, an image quality regulating method of a television receiver concerning this invention is characterized by the following composition.
[0016]Based on this invention, i.e., decrypted input moving image image data, it is an image quality regulating method of a television receiver which displays a picture on a display for indication, and the 1st operational mode is characterized by comprising the following:
An image processing process which performs predetermined image processing (for example, definition conversion processing or trimming treatment) to said input moving image image data.
A picture quality adjustment process of performing two or more kinds of different picture quality adjustments in the 1st operational mode to dynamic image data by which image processing was carried out in said image processing process.
A display control process of displaying several sample video in which image quality differs in the 1st operational mode based on two or more kinds of dynamic image data with which image quality was adjusted at said picture quality adjustment process, respectively on the same display screen of said display for indication.
An image quality setting-out process of setting up image quality of video at the time of

displaying on said display for indication based on input moving image image data in the 2nd operational mode according to sample video chosen in any from said two or more sample video currently displayed on said display for indication in the 1st operational mode.

[0017]
[Embodiment of the Invention]Hereafter, the television receiver concerning this invention is explained in detail with reference to drawings.
[0018][A 1st embodiment] Drawing 1 is a block diagram showing the example of composition of the television receiver concerning a 1st embodiment, a solid line expresses a data line and a dashed line expresses a control line.
[0019]The television receiver shown in the figure, The tuner unit 1.1, the decoder units 1.2, the image processing unit 1.3, the 1st memory unit 1.4, the switch unit 1.5, the picture quality adjustment unit 1.6, the display control unit 1.7, the external input unit 1.8, the system control unit 1.9, It has the 2nd memory unit 1.10 and the display unit 1.11.
[0020]First, operation of a television receiver provided with the above-mentioned composition is outlined. The picture quality adjustment can take two kinds of operational modes with the "normal mode" in which the usual viewing and listening as a television receiver is possible with the "adjustment mode" in which the television receiver concerning this embodiment has the possible picture quality adjustment of a display image, without carrying out.
[0021]That is, in the "normal mode", the decoder units 1.2 decode the bit stream inputted from the output signal from the tuner unit 1.1, or the exterior. The decoded signal is sent to the picture quality adjustment unit 1.6 via the switch unit 1.5, Predetermined picture quality adjustment processing (following and picture quality adjustment component stereo processing) adjusted to the image quality set up in the picture quality adjustment unit 1.6 now is performed, it is changed into a composite signal, and the display control unit 1.7 displays the picture based on the composite signal on the display unit 1.11.
[0022]On the other hand in "adjustment mode", the decoder units 1.2, The still picture for [arbitrary] one frame is sampled from the signal which decoded the input signal, it outputs to the image processing unit 1.3, and the image processing unit 1.3 reduces or trims the inputted still picture in desired size. The reduction or still picture (henceforth, processing still picture) by which trimming was carried out is saved at the 1st memory unit 1.4. the processing still picture in which the picture quality adjustment unit 1.6 was saved at the 1st memory unit 1.4 -- multiple times -- it reads sequentially and image adjustment processing (following and picture quality adjustment component stereo processing) different, respectively is performed for every read processing still picture of the. And each processing still picture used as the image quality which differs by performing processing in the picture quality adjustment unit 1.6, respectively, It is outputted to the display control unit 1.7 as a picture signal for one frame, and as a sample

picture for picture quality adjustments, it is displayed on the display unit 1.11 so that it may illustrate to drawing 10 or drawing 11.

[0023]Next, each block of the television receiver shown in drawing 1 is explained in detail.

[0024]The <tuner unit 1.1> tuner unit 1.1, By referring to PAT (Program Association Table) beforehand remembered that an operator specifies a desired channel or PMT (Program Map Table), The PID (Program ID) number of the packet which transmits the component which constitutes the channel comes to hand, The recovery to the received data of various digital television broadcasting which change a transponder (un-illustrating) according to the number which came to hand, and are inputted from the exterior via the transponder, By performing an error correction etc., TS (Transport Stream) is generated and the generated TS is outputted to the latter decoder units 1.2.

[0025]<Decoder-units 1.2> drawing 3 is a block diagram showing the composition of the decoder units contained in the television receiver concerning a 1st embodiment.

[0026]The decoder units 1.2, The buffer unit 4.1, the variable-length decoding unit 4.2, the inverse quantization unit 4.3, the reverse DCT (Discrete Cosine Transform) unit 4.4, the motion-compensation-prediction unit 4.5, the video memory unit 4.6, It has the format conversion unit 4.7.

[0027](Buffer unit 4.1) The buffer unit 4.1 is a buffer which memorizes temporarily the video signal outputted from the tuner unit 1.1, or the bit stream (coding data) inputted from the exterior.

[0028](Variable-length decoding unit 4.2) In the variable-length decoding unit 4.2. while reading the coding data (TS) buffered by the buffer unit 4.1 and decoding macro block encoded information out of the read coding data -- coding mode -- it moves and ** KUTORU, quantization information, and a quantization DCT coefficient are separated. The variable-length-coding processing performed here with the encoder with which a sending set (un-illustrating) is provided, In the variable-length decoding processing which is performed by assigning a shorter code to data with the higher frequency of occurrence, and is performed with the variable-length decoding unit 4.2 of a receiver, processing contrary to the coding processing is performed.

[0029](Inverse quantization unit 4.3) In the inverse quantization unit 4.3, inverse quantization of the quantization DCT coefficient of 8x8 decoded with the variable-length decoding unit 4.2 is carried out, and it restores to a DCT coefficient. The quantization table beforehand defined according to people's vision characteristics is used for quantization processing here, Inverse quantization processing [in / for accumulating / a line crack and the inverse quantization unit 4.3 of a receiver] for which spatial compression of the information which should be transmitted in the encoder with which a sending set (un-illustrating) is provided is performed is performed by referring to a predetermined inverse quantization table in processing contrary to the

quantization processing.

[0030](Reverse DCT unit 4.4) The reverse DCT unit 4.4 changes an above-mentioned DCT coefficient into pixel space data. Although DCT and reverse DCT operation are defined by the real number operation, in order that quantization processing may enter between them, the reverse DCT operation result in the decoder units 1.2 is not necessarily in agreement with a DCT input value, and, moreover, also becomes an integer. Therefore, when the value below the decimal point of the result of an operation is set to 0.5, and integer-izing the result of an operation, the case where it becomes upvaluation, and the case where it becomes a cut arise. However this mismatch may specify arithmetic precision highly, since it is unsolvable, it takes the measure which makes small establishment from which the value below the decimal point of the reverse DCT operation result which is not accompanied by an error is set to 0.5 by changing the coefficient value after inverse quantization processing minutely by this embodiment as that measure.

[0031](Motion compensation prediction 4.5) The motion-compensation-prediction unit 4.5 can take motion-compensation-prediction mode and intra coding mode, and the change in the mode is performed by control of the system control unit 1.9 mentioned later.

[0032]The motion-compensation-prediction unit 4.5 is added to the output data from the reverse DCT unit 4.4 which mentioned above the data of the image block by which motion compensation prediction was carried out in the case of motion-compensation-prediction mode. However, in the case of intra coding mode, this processing is not performed. This coding mode is determined as each macro block unit, when the time correlation of motion-compensation-prediction mode is high, high encoding efficiency can be expected, and by big change of a scene, etc., intra coding mode is used, when time correlation cannot be expected.

[0033](Video memory unit 4.6) The video memory unit 4.6 saves I (Intra coded) picture and P (Predictive coded) picture as a reference pixel used by decoding processing.

[0034](Format conversion unit 4.7) The format conversion unit 4.7, . In order to raise encoding efficiency, were rearranged with the variable-length decoding unit 4.2. Rearrangement to the original entry sequenced foreword is performed for I picture, P picture, and B (Bidirectionally predictive coded) picture, and image size is changed if needed.

[0035]The <image processing unit 1.3> image processing unit 1.3, The video signal for one arbitrary frame is read from the decoder units 1.2 mentioned above, and the reducing process by definition conversion or trimming (clipping) processing is performed that the part image used as the base for picture quality adjustments should be created to the read video signal.

[0036]Here, the definition conversion processing and trimming treatment which are performed with the image processing unit 1.3 are explained.

[0037](Definition conversion processing) The definition conversion processing in the image processing unit 1.3 should just carry out contraction of the 640x480-pixel whole video signal for

one frame which is level and has vertical definition, for example to the resolution of 320x240 pixels (in one half of the cases [Are horizontal and vertical.]).

[0038]Drawing 4 is a figure explaining the definition conversion processing by the image processing unit contained in the television receiver concerning a 1st embodiment.

[0039]What is necessary is just to adopt the method of using a definition conversion pixel using FIR (Finite Impulse Response) filters, such as next door interpolation, a linear interpolation method, 3rd tatami lump interpolation, as a definition conversion disposal method these days etc.

[0040]Next door interpolation is the method of making the input pixel (pixel used in order to create the pixel inserted for interpolation) nearest to output picture elements (the pixel inserted for interpolation: interpolating picture element) an interpolating picture element these days. That is, in drawing 4 (a), the case where the pixel b is interpolated in the input pixel a1 located in a line with the distance interval 1 and the position (between the pixels a1 and a2) which is in the distance of u and v from a2, respectively is considered. If the distance u is smaller than the distance v, a1 will be used as the interpolation pixel b. The distance u and the distance v use the front data a1 as the interpolation data b, in being equal (when a definition conversion ratio is an integral multiple). Of course, the back data a2 may be used conversely.

[0041]Here, as an example, as shown in drawing 4 (C), the case where resolution is changed into 1/2 (reduction) is explained. In this case, 2-pixel output data is created from 4-pixel input data. Therefore, picture-element-data b_n after the definition conversion by next door interpolation is given by a formula (1) these days using input data a_n, respectively.

[0042]

$b_{n+1}=a_{2n+1}$ (n= 0, 1, 2 --) It may carry out like (1) or a following formula.

[0043]

$b_{n+1}=a_{2n+2}$ (n= 0, 1, 2 --) (2) and a linear interpolation method are methods of asking for the picture element data of a pixel which should be interpolated in the position using the picture element data of the pixel in both the sides of the position which interpolates a pixel. For example, as shown in drawing 5 (a), when interpolating the pixel b in the position (between pixel a_1 and a_2) which is in the distance of u and v, respectively from pixel a_1 located in a line with the distance interval 1, and a_2, the picture element data of the pixel b is called for by a formula (3).

[0044]

$b=a_1xv/(u+v)+a_2xu/(u+v)$ (3) 3rd tatami lump interpolation is a method of asking for the every 2 pixels picture element data in both the sides of the position which interpolates a pixel, and the picture element data of a pixel which should be interpolated using a 3rd tatami lump function

(Cubic function). The 3rd tatami lump function f is acquired by carrying out window function processing so that it may cut off the Sin function given by a formula (4) in the pixel to interpolate and the field of five taps of every 2 pixels of both sides located in a line with the distance interval 1. Therefore, by the position which should interpolate a pixel, and the range of the distance t between 2 pixels of both sides, the 3rd tatami lump function f is given, as shown in a formula (5), (6), and (7).

[0045]

f (t) =Sin(pit)/(pit) (4) and $f(t) = 1-2x|t|^2+|t|^3$ ($0<=|t|<1$) (5), $f(t) = 4-8x|t|+5x|t|^2-|t|^3$ ($1<=|t|<2$) (6) and f(t) =0 ($2<=|t|$) So that it may be shown in (7 (b)), for example, drawing 4, Pixel a_1 located in a line with the distance interval 1, a_2, a_3, When interpolating the pixel b in the position (between pixel a_2 and a_3) which is in the distance of u1, u2, u3, and u4 from a_4, respectively, the picture element data of the pixel b is called for by a formula (8) using this 3rd tatami lump function f.

[0046]

$b=a_1x. (4-8xu1+5xu1^2-u1^3) +a_2x(1-2xu2^2+u2^3) +a_3x(1-2xu3^2+u3^3) +a_4x (4-8xu4+5xu4^2-u4^3)$. As only the reducing process explained using drawing 4 (C) performs them by this embodiment at the time of expansion although both (8) and the above explanation are common at the time of reduction, and mentioned above, it can respond also to definition conversion ratios other than an integer ratio (for example, 3 / 16 grades).

[0047]When performing definition conversion about two-dimensional image data, definition conversion processing of the two-dimensional image data can be carried out by performing level and processing above-mentioned about each perpendicular direction one by one.

[0048]It is also possible level and to carry out definition conversion for magnification which is horizontal and vertical and is different by performing vertical processing continuously independently.

[0049](Trimming treatment) What is necessary is for the trimming treatment in the image processing unit 1.3 to choose only some (for example, 320x240 pixels) fields of the 640x480-pixel video signal for one frame which is level and has vertical definition, for example, and just to output it. For example, a central field may be outputted as are shown in drawing 7 (a), and only the field of one fourth of the area (horizontal and vertical both 1/2) at the upper left of all the input signal fields is outputted or shown in drawing 7 (b). The starting specification of a field which should be carried out trimming is specified with the system control unit 1.9 mentioned later, and is made [specify / level and / the trimming start position / level and / in a perpendicular direction, and / of a trimming region / vertical width]. The ratio of the field and inputted image (video signal for one frame) by which trimming is carried out makes setting out

possible arbitrarily with the below-mentioned system control unit 1.9.
[0050]The 1st memory unit 1.4 of <the 1st memory unit 1.4> saves temporarily reduction or the data of a video signal by which trimming was carried out with the image processing unit 1.3 mentioned above, and it is a memory unit which can respond to high speed reading.
[0051]For example, as shown in drawing 7 (a), it reduces to one fourth of the area (are horizontal and vertical 1/2) of input resolution with the image processing unit 1.3, Or when trimming is carried out, the video signal saved at the 1st memory unit 1.4 temporarily is read 4 times with the picture quality adjustment unit 1.6 mentioned later. That is, horizontally, reduction or when trimming is carried out, and when [trimming is carried out and / perpendicular direction / M / 1/], LxM time reading appearance of reduction or the video signal stored in the 1st memory unit 1.4 is carried out to 1/L.
[0052]The <switch unit 1.5> switch unit 1.5, By control by the system control unit 1.9 mentioned later, an operator changes selectable "adjustment mode" for combination processing (a picture quality adjustment component stereo is called hereafter) of picture quality adjustments, such as luminosity and contrast, to the "normal mode."
[0053]That is, when the "normal mode" is chosen, the switch unit 1.5 transmits the video signals (the usual television broadcasting etc.) outputted from the decoder units 1.2 mentioned above to the below-mentioned picture quality adjustment unit 1.6. On the other hand, when "adjustment mode" is chosen, the switch unit 1.5 is transmitted to the picture quality adjustment unit 1.6 which mentions later the video signal (the reduction or the still picture by which trimming was carried out for picture quality adjustments) outputted from the 1st memory unit 1.4 mentioned above.
[0054]The picture quality adjustment performed in the <picture quality adjustment unit 1.6>, next the picture quality adjustment unit 1.6 is explained with reference to drawing 11 from drawing 8.
[0055]In the picture quality adjustment unit 1.6, it is carried out by adjustment of brightness (luminosity), contrast, sharpness, Hugh (hue), etc. combining, for example.
[0056]The picture quality mode chosen by the operator in the "adjustment mode" performed previously in the "normal mode", Or processing which adjusts a display image is performed to the picture quality mode in the default at the time of factory shipments (when setting out by an operator is not performed) to the output signal from the decoder units 1.2 mentioned above.
[0057]In "adjustment mode", reduction or the video signal data by which trimming was carried out from the 1st memory unit 1.4 mentioned above, a LxM time -- it reads sequentially and component stereo processing of different picture quality adjustment beforehand defined that the screen for adjustment illustrated to drawing 10 or drawing 11 should be displayed whenever it performed the read-out once is performed.
[0058]Drawing 8 and drawing 9 are the figures explaining the example of a combination

pattern of the picture quality adjustment which the picture quality adjustment unit in a 1st embodiment performs in "adjustment mode", and, as for drawing 8, in the case of four kinds of combination patterns, drawing 9 shows the case of nine kinds of combination patterns.
[0059]In each setting out of the combination shown in drawing 8, component stereo (combination pattern) ID1 is a normal condition still in the state at the time of factory shipments. Component stereo ID2 is soft image quality setting out which strengthened brightness and weakened contrast and sharpness. Component stereo ID3 is gorgeous image quality setting out which weakened brightness and strengthened contrast and sharpness.
[0060]In order to make the example of a combination pattern shown in drawing 8 correspond to the number of partitions of the picture in the adjustment screen (refer to drawing 10 and drawing 11) displayed when performing picture quality adjustment, while an operator looks at the display unit 1.11 in "adjustment mode", and 1 to 1, According to the number of combination patterns, reduction or trimming treatment is performed in the above-mentioned image processing unit 1.3 by control of the system control unit 1.9 mentioned later.
[0061]For example, level and vertical display resolution of the display unit 1.11 (size) which are mentioned later are 640x480 pixels, When the outputted image from the above-mentioned decoder units 1.2 is 640x480 pixels and the number of picture quality adjustment component stereos (combination pattern) is four kinds, in the above-mentioned image processing unit 1.3. Level and a perpendicular direction reduce or trim the video signal for one extracted frame (still picture) to one half.
[0062]Drawing 10 and drawing 11 are figures which illustrate the adjustment screen displayed on a display unit in the "adjustment mode" in a 1st embodiment, and when a reduction image is displayed, drawing 10 drawing 11, The case where a trimming picture is displayed is shown and four kinds of combination patterns which show drawing 8 in any case are supported.
[0063]In the "normal mode", the output signal from the picture quality adjustment unit 1.6 mentioned above is changed into the signal in which an output is possible, and the <display control unit 1.7> display control unit 1.7 outputs it at the display unit 1.11 mentioned later.
[0064]By control of the system control unit 1.9 which the display control unit 1.7 mentions later in "adjustment mode." It constitutes, and the operation screen of a layout as shows drawing 10 or drawing 11 the video signal with which picture quality adjustment component stereo processing which changes with picture quality adjustment units 1.6 mentioned above, respectively was performed, for example is changed into the signal in which an output is possible, and is outputted at the display unit 1.11 mentioned later.
[0065]The <external input unit 1.8> external input units 1.8 are external input units, such as remote control, for example, and can carry out selection setting of the favorite picture quality adjustment component stereo out of two or more kinds of picture quality adjustment component stereo pictures (drawing 10 and drawing 11) which the operator mentioned above.

[0066]The information inputted in the external input unit 1.8 is judged in the system control unit 1.9 mentioned later, and each unit shown in drawing 1 according to the judgment is adjusted. The white frame in the mode 1 shown in drawing 10 and the mode 3 shown in drawing 11 shows the picture quality adjustment component stereo which the operator has chosen with the external input unit 1.8.

[0067]The <display unit> display units 1.11 are dot-matrix displays, such as a liquid crystal display and a plasma display, or a CRT display, for example, and display a picture based on the output signal of the display control unit 1.7.

[0068]The 2nd memory unit 1.10 of <the 2nd memory unit>, ID (for example, component stereo ID1 shown in drawing 8) of the combination pattern of picture quality adjustment which realizes the picture quality mode in the predetermined default (preset value at the time of factory shipments) read at the time of reset is stored, and. The combination pattern (for example, component stereo ID2 thru/or 4 shown in drawing 8) of the picture quality adjustment which the operator chose in "adjustment mode" is saved. When "adjustment mode" is chosen by the operator, the system control unit 1.9, Component stereo ID stored in the 2nd memory unit 1.10 is displayed on a picture quality adjustment screen (drawing 10 or drawing 11) so that distinction is possible as present preset value (for example, what is necessary is to attach a color frame to the part image corresponding to the image quality chosen now, and just to display on it in the picture shown in drawing 10 and drawing 11).

[0069]The <system control unit 1.9>, next the system control unit 1.9 are explained with reference to drawing 12 and drawing 13.

[0070]Drawing 12 is a flow chart which shows the setting-out regulated treatment in the system control unit contained in the television receiver concerning a 1st embodiment, and shows the procedure performed with the microcomputer which is not illustrated in the system control unit 1.9. This setting-out regulated treatment is started by supplying a power supply to the television receiver shown in drawing 1.

[0071]In the figure, perform predetermined initial setting to the step S11.1:tuner unit 1.1, the decoder units 1.2, and the image processing unit 1.3, and. The switch unit 1.5, the picture quality adjustment unit 1.6, and the display control unit 1.7 are set as the "normal mode" mentioned above.

[0072]Step S11.2, Step S11.3 : It stands by until the picture quality adjustment demand by an operator is inputted into the external input unit 1.8 (Step S11.2), When it detects that the picture quality adjustment demand was inputted, the image processing unit 1.3, the memory unit 1.4, the switch unit 1.5, the picture quality adjustment unit 1.6, and the display control unit 1.7 are changed into the "adjustment mode" mentioned above (Step S11.3).

[0073]Step S11.4, Step S11.5: Perform the picture quality adjustment component stereo selection process later mentioned with reference to drawing 13 (Step S11.4), and set the

picture quality adjustment unit 1.6 as the picture quality mode (picture quality adjustment component stereo) selected by the processing (Step S11.5).

[0074]Step S11.6: Set up the "normal mode" again to the switch unit 1.5, the picture quality adjustment unit 1.6, and the display control unit 1.7, and return to Step S11.2.

[0075]Here, the details of the picture quality adjustment component stereo selection process of Step S11.4 are explained.

[0076]Drawing 13 is a flow chart which shows the details of the picture quality adjustment component stereo selection process included in the setting-out regulated treatment shown in drawing 12.

[0077]In the figure, by controlling the step S12.1:image processing unit 1.3, the memory unit 1.4, the switch unit 1.5, the picture quality adjustment unit 1.6, and the display control unit 1.7, The picture quality adjustment component stereo selection picture which enabled distinction of the picture quality mode chosen last time on the display unit 1.11 in the display screen illustrated, for example to drawing 10 or drawing 11 with the color frame etc. is displayed.

[0078]Step S12.2 - Step S12.4 : The arrow key which is not illustrated [which was provided in the external input unit 1.8] (upper and lower sides and right and left), When it detects that stood by (Step S12.2) and the arrow key was pressed at Step S12.3 until it is pushed any of a set key (determining key) and a reset key they are, A color frame is moved according to the direction corresponding to the pressed arrow key, and selection mode is changed (Step S12.4), and it returns to Step S12.2.

[0079]Step S12.5 - Step S12.7 : on the other hand, when the set key or the reset key is pressed at Step S12.3, The reset key is pressed and judge **, and at the time of YES, default configuration (setting-out picture quality adjustment component stereo at the time of factory shipments) is become final and conclusive as new selection mode by the judgment (Step S12.7) (when the reset key is pressed), At the time of NO, the picture quality adjustment component stereo chosen now is become final and conclusive as new selection mode (Step S12.6). (when the set key is pressed)

[0080]Step S12.8: Save the settled selection mode at the 2nd memory unit 1.10.

[0081]As explained above, according to this embodiment, an operator only chooses the still picture of the favorite image quality for which it asks out of the adjustment screen (drawing 10 or drawing 11) displayed on the display unit 1.11, and can adjust to the image quality which asks for a television receiver easily.

[0082][A 2nd embodiment] Next, a 2nd embodiment based on the television receiver concerning a 1st embodiment mentioned above is described. In the following explanation, the overlapping explanation is omitted and the same composition as a 1st embodiment is explained focusing on the characteristic portion in this embodiment.

[0083]Drawing 2 is a block diagram showing the example of composition of the television

receiver concerning a 2nd embodiment, a solid line expresses a data line and a dashed line expresses a control line.

[0084]The television receiver shown in the figure The tuner unit 2.1, the decoder units 2.2, the image processing unit 2.3, the picture quality adjustment unit 2.4.1, or 2.4.n, It has the picture quality adjustment unit 2.5, the 2nd switch unit 2.6, the display control unit 2.7, the external input unit 2.8, the system control unit 2.9, the memory unit 2.10, and the display unit 2.11.

[0085]If a point which first is different from a 1st embodiment that this embodiment mentioned above is explained, it differs in that the video signal which the image processing unit 2.3 chooses is not a still picture but the video for one frame. the still picture for [arbitrary] one frame being sampled, and trimming treatment being reduced or carried out, and from the decoder units 1.2, by a 1st embodiment, in more detail, An operator desired image quality to having constituted selectable, looking at the adjustment screen which performed two or more kinds of picture quality adjustment component stereo processings to this, and was displayed on the display unit 1.11 in this embodiment. the dynamic image data outputted from the decoder units 2.2 -- reduction -- or trimming treatment is carried out, two or more kinds of picture quality adjustment component stereo processings are performed in parallel, and an operator constitutes desired image quality selectable using two or more of the processed video samples. Therefore, in this embodiment, in order to display the video sample from which image quality differs, respectively in real time, it does not have the memory equivalent to the 1st memory unit 1.4 in a 1st embodiment.

[0086]In the picture quality adjustment component stereo processing in this embodiment, filtering (highpass, low pass) of a time base direction is performed.

[0087]First, operation of a television receiver provided with the above-mentioned composition is outlined. Also in the television receiver concerning this embodiment, the picture quality adjustment can take two kinds of operational modes with the "normal mode" in which the usual viewing and listening as a television receiver is possible with the "adjustment mode" in which the picture quality adjustment of a display image is possible, without carrying out.

[0088]That is, in the "normal mode", the decoder units 2.2 decode the bit stream inputted from the output signal from the tuner unit 2.1, or the exterior. The decoded signal is sent to the picture quality adjustment unit 2.5 via the switch unit 2.5, Predetermined picture quality adjustment processing (picture quality adjustment component stereo processing) adjusted to the image quality set up in the picture quality adjustment unit 2.6 now is performed, it is changed into a composite signal, and the display control unit 2.7 displays the picture based on the composite signal on the display unit 2.11.

[0089]On the other hand, in "adjustment mode", the decoder units 2.2 output the signal which decoded the input signal to the image processing unit 2.3. The image processing unit 2.3 is reduced or trimmed in the size of a request of the video inputted. The reduction or video

(henceforth, processing video) by which trimming was carried out is transmitted to the picture quality adjustment unit 2.4.1 - 2.4.n, and picture quality adjustment component stereo processing adjusted to image quality different, respectively is performed to the inputted processing video in these picture quality adjustment unit. And each processing video used as the image quality which differs, respectively by performing processing in the picture quality adjustment unit 2.4.1 - 2.4.n, It is outputted to the display control unit 2.7 via the 2nd switch unit 2.6, and as sample video for picture quality adjustments, it is displayed on the display unit 2.11 so that it may illustrate to drawing 10 or drawing 11 (however, equivalent to a frame with video in this embodiment).

[0090]Next, the picture quality adjustment component stereo processing performed in the picture quality adjustment unit 2.4.1 which is the feature of this embodiment - 2.4.n is explained.

[0091]The picture quality adjustment unit 2.4.1 - 2.4.n, High definition-ized processing of a time base direction is also performed by facing performing picture quality adjustment component stereo processing to reduction or the processing video by which trimming was carried out inputted, and adding filtering of a time-axis to the same picture quality adjustment component stereo processing as a 1st embodiment mentioned above.

[0092]Drawing 14 and drawing 15 are the figures explaining the example of a combination pattern of the picture quality adjustment which the picture quality adjustment unit in a 2nd embodiment performs in "adjustment mode", and, as for drawing 14, in the case of four kinds of combination patterns, drawing 15 shows the case of nine kinds of combination patterns.

[0093]In each setting out of the combination shown in drawing 14, component stereo (combination pattern) ID1 is a normal condition still in the state at the time of factory shipments. Component stereo ID2 is soft image quality setting out which strengthens brightness, and weakens contrast and sharpness, and performs low pass filter processing to a time base direction. Component stereo ID3 is gorgeous image quality setting out which weakens brightness, and strengthens contrast and sharpness, and performs highpass filter processing to a time base direction.

[0094]Drawing 16 is a figure which illustrates the filter with which a picture quality adjustment unit is provided in a 2nd embodiment, drawing 16 (a) shows a low pass filter, and drawing 16 (b) shows a highpass filter. Although any filter has illustrated the filter of three taps, it may be a filter of any tap.

[0095]The processing video adjusted to image quality which is different in "adjustment mode", respectively in the above-mentioned picture quality adjustment unit 2.4.1 - 2.4.n, It is changed into the sample dynamic image signal for picture quality adjustments with the display control unit 2.7, and the video for adjustment of the layout illustrated to drawing 10 or drawing 11 is displayed on real time.

[0096]Thus, according to this embodiment, desired image quality can be chosen looking at the sample of the video displayed on the display unit 2.11, and it can adjust to the image quality which asks for a television receiver easily like a 1st embodiment.
[0097][A 3rd embodiment] Next, a 3rd embodiment based on the television receiver concerning a 1st embodiment mentioned above is described. In the following explanation, the overlapping explanation is omitted and the same composition as a 1st embodiment is explained focusing on the characteristic portion in this embodiment.
[0098]Drawing 5 is a block diagram showing the example of composition of the television receiver concerning a 3rd embodiment, a solid line expresses a data line and a dashed line expresses a control line.
[0099]The television receiver shown in the figure, The tuner unit 6.1, the decoder units 6.2, the 1st switch unit 6.3, the definition conversion unit 6.4, the trimming unit 6.5, the 1st memory unit 6.6, the 2nd switch unit 6.7, the picture quality adjustment unit 6.8, the display control unit 6.9, It has the external input unit 6.10, the system control unit 6.11, the 2nd memory unit 6.12, and the display unit 6.13.
[0100]If a point which first is different from a 1st embodiment that this embodiment mentioned above is explained, The image processing unit 1.3 in a 1st embodiment to having had composition which performs any of a reducing process (definition conversion) or trimming treatment they are in this embodiment. It differs in that these definition conversion processing and trimming treatment are changed according to the number of picture quality adjustment component stereos (combination pattern). Since the display size of one sample becomes small as the choice (modal numbers) of this increases in the adjustment screen shown, for example in drawing 10 or drawing 11, When it becomes the number of partitions more than [a certain] fixed, the direction of trimming is because it is legible about the still picture of a sample for an operator rather than reducing by definition conversion.
[0101]Hereafter, operation of the television receiver in this embodiment is outlined. Also in the television receiver concerning this embodiment, the picture quality adjustment can take two kinds of operational modes with the "normal mode" in which the usual viewing and listening as a television receiver is possible with the "adjustment mode" in which the picture quality adjustment of a display image is possible, without carrying out.
[0102]That is, in the "normal mode", the decoder units 6.2 decode the bit stream inputted from the output signal from the tuner unit 6.1, or the exterior. The decoded signal is sent to the picture quality adjustment unit 6.8 via the switch unit 6.7, Predetermined picture quality adjustment processing (following and picture quality adjustment component stereo processing) adjusted to the image quality set up in the picture quality adjustment unit 6.8 now is performed, it is changed into a composite signal, and the display control unit 6.9 displays the picture based on the composite signal on the display unit 6.13.

[0103]On the other hand in "adjustment mode", the decoder units 6.2, Sample the still picture for [arbitrary] one frame from the signal which decoded the input signal, and via the 1st switch unit 6.3, the number of picture quality adjustment component stereos (combination pattern) which can be referred to is more than a predetermined number -- it comes out, in a certain case, it is inputted into the trimming unit 6.5, and trimming is carried out to desired size, and when smaller than the predetermined value concerned, it is inputted into the definition conversion unit 6.4, and is reduced to desired resolution. The processing still picture processed in the definition conversion unit 6.4 or the trimming unit 6.5 is saved at the 1st memory unit 6.6. the processing still picture in which the picture quality adjustment unit 6.8 was saved at the 1st memory unit 6.6 -- multiple times -- it reads sequentially and image adjustment processing (following and picture quality adjustment component stereo processing) different, respectively is performed for every read processing still picture of the. And each processing still picture used as the image quality which differs by performing processing in the picture quality adjustment unit 6.8, respectively, It is outputted to the display control unit 6.9 as a picture signal for one frame, and as a sample picture for picture quality adjustments, it is displayed on the display unit 6.13 so that it may illustrate to drawing 10 or drawing 11.

[0104]Thus, since according to this embodiment the same effect as a 1st embodiment is acquired and reduction or trimming is suitably chosen according to the number of picture quality adjustment component stereos (combination pattern) which can be referred to, convenience can be improved more.

[0105][A 4th embodiment] Next, a 4th embodiment based on the television receiver concerning the 1st thru/or a 3rd embodiment mentioned above is described. In the following explanation, the overlapping explanation is omitted and the same composition as the 1st thru/or a 3rd embodiment is explained focusing on the characteristic portion in this embodiment.

[0106]Drawing 6 is a block diagram showing the example of composition of the television receiver concerning a 4th embodiment, a solid line expresses a data line and a dashed line expresses a control line.

[0107]The television receiver shown in the figure Tuner unit 7.1, decoder-units 7.2, 1st switch unit 7.3, definition conversion unit 7.4, trimming unit 7.5, and picture quality adjustment unit 7.6.1-7.6.n, It has the picture quality adjustment unit 7.7, the 2nd switch unit 7.8, the display control unit 7.9, the external input unit 7.10, the system control unit 7.11, the memory unit 7.12, and the display unit 7.13.

[0108]If a point which first is different from the 1st thru/or a 3rd embodiment which this embodiment mentioned above is explained, As opposed to the image processing unit 1.3 in a 1st embodiment having had composition which performs any of a reducing process (definition conversion) or trimming treatment to the still picture for one frame they are, According to this embodiment, it differs in that definition conversion processing concerned and trimming

treatment are changed according to the number of picture quality adjustment component stereos (combination pattern) to video. The reason for changing a reducing process and trimming treatment is the same as the reason explained by a 3rd embodiment, and is for making recognition of the video by an operator easy.

[0109]In this embodiment, in order to treat video, it has two or more picture quality adjustment units 7.6.1 thru/or 7.6.n which generates processing video like a 3rd embodiment, When adjusting image quality with these each unit, high definition-ization by adding filtering (highpass, low pass) of a time base direction is attained.

[0110]Hereafter, operation of the television receiver in this embodiment is outlined. Also in the television receiver concerning this embodiment, the picture quality adjustment can take two kinds of operational modes with the "normal mode" in which the usual viewing and listening as a television receiver is possible with the "adjustment mode" in which the picture quality adjustment of a display image is possible, without carrying out.

[0111]That is, the operation in the "normal mode" is the same as that of a 2nd embodiment. As opposed to the dynamic image signal outputted from the decoder units 7.2 in "adjustment mode" on the other hand, According to the number of picture quality adjustment component stereos (combination pattern) which can be referred to, a reducing process or trimming treatment is performed in the definition conversion unit 7.4 or the trimming unit 7.5 like a 3rd embodiment. The processing video outputted from the definition conversion unit 7.4 or the trimming unit 7.5, After being adjusted to image quality which is inputted into the picture quality adjustment unit 7.6.1 thru/or 7.6.n, and is different, respectively, It is inputted into the display control unit 7.13 via the 2nd switch unit 7.8, and is changed into the sample dynamic image signal for picture quality adjustments with the display control unit 7.13, and the video for adjustment of the layout illustrated to drawing 10 or drawing 11 is displayed on real time.

[0112]Thus, since according to this embodiment the same effect as 1st and 2nd embodiments is acquired and reduction or trimming is suitably chosen according to the number of picture quality adjustment component stereos (combination pattern) which can be referred to, convenience can be improved more.

[0113]

[Other embodiments] Even if it applies this invention to the system which comprises two or more apparatus (for example, a host computer, an interface device, a reader, a printer, etc.), it may be applied to the devices (for example, a copying machine, a facsimile machine, etc.) which consist of one apparatus.

[0114]The purpose of this invention the storage (or recording medium) which recorded the program code of the software which realizes the function of an embodiment mentioned above, It cannot be overemphasized that it is attained, also when a system or a device is supplied and the computer (or CPU and MPU) of the system or a device reads and executes the program

code stored in the storage. In this case, the function of an embodiment which the program code itself read from the storage mentioned above will be realized, and the storage which memorized that program code will constitute this invention. By executing the program code which the computer read, A part or all of processing that the operating system (OS) etc. which the function of an embodiment mentioned above is not only realized, but are working on a computer based on directions of the program code are actual is performed, and it is contained also when the function of an embodiment mentioned above by the processing is realized.

[0115]After the program code read from the storage was written in the memory with which the function expansion unit connected to the expansion card inserted in the computer or the computer is equipped, Based on directions of the program code, a part or all of processing that CPU etc. with which the expansion card and function expansion unit are equipped are actual is performed, and it is contained also when the function of an embodiment mentioned above by the processing is realized.

[0116]

[Effect of the Invention]As explained above, according to this invention, offer of a television receiver which can be adjusted, and an image quality regulating method for the same is easily realized in the image quality which asks for a display image.

[Translation done.]